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Abstract

HEAVY WATER REACTORS PHYSICS

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An important research programme on heavy water reactor physics has been carried out in France for quite a few years. The decision to build the EL 4 prototype and so to choose the heavy water gas cooled type has renewed the interest in this programme and at the same time given to it a more specific orientation. A summary of the results gained in this field is presented in this paper.

In the first part are described the experimental investigations, most of them were carried out in the criticality facility Aquilon II. The experiments are grouped in four parts :

- Systematic studies of lattices. Buckling measurements.
- Specific studies of gas-cooled lattices.
- Fine structure, spectral indices measurements etc ...
- Measurements on lattices or samples containing Uranium of various enrichment or Plutonium.

The second part is devoted to a summary of the theoretical studies. The whole results have allowed an improvement of the calculation methods, have led to a better understanding of the neutron balance in lattices, and have permitted the establishment of a set of formula to predict not only the clean fuel conditions but also the evolution of the nuclear properties with irradiation. Some specific studies on power reactor are quoted.

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